

the wings. . . . In the resting position their identification is easy. In this attitude they can be distinguished from all other blood-sucking Diptera . . . by the fact that the brownish wings lie closed flat over one another down the back, like the blades of a pair of scissors, while the proboscis projects horizontally in front of the head" (p. 3)

There is one peculiarity of *Gl. morsitans* that may be noted, viz. it does not lay eggs as do the majority of the Diptera, but extrudes a yellow-coloured larva nearly as large as the abdomen of the mother. Whether this process is the same in all species has yet to be determined. Of the seven species of tsetse described, one (*Gl. pallidipes*) is new, and appears to be the East African representative of *Gl. longipalpis*. The work concludes with some valuable appendices of information from travellers, Government reports, the reports of Colonel Bruce and others.

When the transmission of malaria by the mosquito was proved, the authorities of the British Museum rose to the occasion and published the magnificent monograph upon the Culicidæ by Mr. Theobald; again they have not disappointed us. In conclusion we would direct attention to the series of models in the entrance hall of the Natural History Museum of the trypanosome and tsetse fly, and of the malaria parasite and mosquito; they should be studied by all who may have the opportunity of increasing our knowledge of these and other tropical diseases.

R. T. H.

#### METALLURGY OF STEEL.

*Hardening, Tempering, Annealing, and Forging of Steel.* By Joseph V. Woodworth. Pp. 288. (Westminster: Constable and Co., Ltd.) Price 10s. net.

TO students who have ploughed through the weary sands of recent steel literature, Mr. Woodworth's book will appear somewhat in the nature of an oasis in the desert. The author does not appear to be versed in the "ites" of metallography, or fully to have grasped the allotropic theory of hardening, but, nevertheless, he does thoroughly understand tool-steel. Authors of papers on the restoration by heat treatment of faulty steel will hardly be prepared to acquiesce in a statement made by Mr. Woodworth on p. 18 of his book, namely,

"Heating for forging is, in its way, quite as important as heating for hardening; care and uniformity in the application of heat in the first instance is very essential. Should the steel be over-heated in this process, no amount of care afterwards will restore the steel to its former state or remedy the evil."

With the words above quoted everyone who has had an extensive practical experience of steel metallurgy will be more than inclined to agree.

On p. 24 attention is directed to the fact that steel as delivered from the manufacturer is always more or less decarbonised on the surface.

"For this reason, do not select a piece of steel which will just 'skin' up, but take a piece large enough to require taking a good-sized cut before reaching the finished surface."

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This is good advice, not only to mechanics, but also to scientific men making researches on the magnetic properties of steel. Mr. Woodworth, in concise and lucid terms, deals at considerable length with the machining, hardening, and tempering of nearly every class of steel tools, and the value of his letter-press is enhanced by a series of admirable illustrations (chiefly in perspective) of turning tools, taps, reamers, and an excellent set of milling cutters.

A brief illustrated article on muffle furnaces (pp. 92-94) is well worth the attention of British artisans, as showing American practice, which is, on an average, undoubtedly superior to that obtaining in this country.

That portion of Mr. Woodworth's book dealing with the manufacture of dies and of drop forgings must necessarily be interesting to British manufacturers and workmen, because America was the birthplace of drop forgings, which were first manufactured by Colonel Colt, of revolver fame, in 1853.

Another feature of the work now under review is the fairly complete and beautifully illustrated chapter on the emery-grinding of steel tools. Mr. Woodworth advocates as the highest type of forgings material which has been quenched in oil and subsequently tempered to remove contraction stresses. The views he expresses have already found favour with many experienced British steel metallurgists.

On p. 162 Mr. Woodworth leaves, for the time being, a branch of steel metallurgy in which he is evidently a past master, and becomes controversial on the well-worn argument of steel *v.* wrought iron forgings. In deciding upon the superiority of steel, the author perhaps a little overdoes it, and his quotation from the report of the American Government tests on alternating stresses will hardly convince steel metallurgists who have closely studied this matter.

The tests he quotes show that wrought iron is capable of enduring only 50,000 alternations. Steel, with 0.25 per cent. of carbon, endures, before fracture, 229,000 alternations, whilst steel with 0.45 per cent. of carbon sustains almost a million alternations. The author considers that these figures

"have given engineers an idea of the comparative endurance of wrought iron and steel in such service as that to which crank-pins, shafting, &c., are subject."

Had Mr. Woodworth seen a verbatim report of the trial to decide the cause of the disaster on H.M.S. *Bullfinch*, which occupied several days at the King's Bench in the summer of 1902, he would probably have expressed a much modified opinion on the question at issue. Broadly speaking, the connecting rods of the *Bullfinch* were of the higher carbon limit just quoted; the rods of H.M.S. *Snapper* contained about the lower limit mentioned, namely, 0.25 per cent. of carbon. The rods of the *Bullfinch* snapped on her trial trip, causing lamentable loss of life. Those of the *Snapper* were taken out intact after the destroyer had run her trial trips and been four years in commission.

An interesting portion of this book is the description of the Taylor-White process, which was the pioneer of those steels known as "speedy-cut," but quite naturally Mr. Woodworth does not specially direct

attention to the fact that since the inauguration of this process its product has been distinctly eclipsed by steels manufactured in several famous Sheffield works.

Mr. Woodworth's book has been written by an able man, thoroughly interested in his craft, and it is to be hoped that it will find its way into the hands of a large number of British artisans.

J. O. ARNOLD.

### OUR BOOK SHELF.

*Macedonian Folklore.* By G. F. Abbott, M.A. Pp. xii + 372. (Cambridge: University Press, 1903.)

THIS somewhat dainty little volume on Macedonian folklore, with its blue and white binding, will be welcomed by many readers, first, because the print and paper are good, and next, because the work is pleasantly written, and every paragraph is of interest. The results collected in the work before us by Mr. G. F. Abbott, of Emmanuel College, Cambridge, are the fruits of a series of researches into the folklore of the Greek-speaking parts of Macedonia, carried on by the author under the auspices of the electors to the Prendergast studentship of the governing body of Emmanuel College, Cambridge, and there can be no doubt that the materials here gathered together amply justify the selection of Mr. Abbott for his mission by the powers that be.

The reader or student who is familiar with the sound and solid work of Prof. E. B. Tylor, and the wonderful volumes of his friendly rival, Mr. J. G. Frazer, will not expect to find in this monograph the vast knowledge and mature thought which are so characteristic of the works of these eminent scholars, but it is pleasant to see that the influence of both of them is visible in Mr. Abbott's treatise, and we therefore look forward to other works from his pen with confidence. "Macedonian Folklore" contains nineteen chapters, six appendices, and an index; the last-named section is very short, and we think it should have been made fuller. After a short description of the sources of the facts which he prints, and a narrative of some amusing personal experiences, Mr. Abbott proceeds to deal with the folklore of the Macedonian year, which he treats in four chapters. Many of the saws are familiar enough to us in other forms, but there are several auguries and prophecies about the weather which are worthy of note for comparative purposes.

The section on divination is of considerable interest, and it seems that the Macedonians divine by means of coffee, instead of by tea as Europeans in the west do. The expert will have no difficulty in tracing a connection between some of the divination practices here described with those of many nations, but there are many which have no parallels among other peoples, so far as we know, and these, of course, form one of the most valuable parts of Mr. Abbott's book.

The chapters on birth, marriage, and funeral rites are lengthy, but very interesting, and the numerous extracts which we have from the songs of the people enable us to judge of the accuracy of the deductions set forth in them. The original Greek is given, in all cases, with an English translation, and this plan is a handy one and one to be commended. We cannot refer to details, for want of space forbids, and we therefore pass on to mention the chapters on Alexander the Great and Philip in folk-tradition, to the series of pretty bird-legends which are printed on pp. 291-294, to notes on the game of morra, fire-ordeal, the perils of portraiture, &c., and to the collections of riddles, mystic poems, love-couplets, &c., which bring the book to an end. Mr. Abbott's contribution to the science of

Macedonian folklore is opportune, and the modesty of the work and the care with which it has been performed merit praise.

*Practical Physics for Schools.* I. Mensuration, Mechanics, and Hydrostatics. Pp. 72. II. Light and Heat. Pp. 79. By C. J. L. Wagstaff, M.A., and G. C. Bloomer, B.A. (Cambridge: W. Heffer and Sons, 1903.) Price 1s. 6d. each.

THE authors say in their preface that these notes have been used for the teaching of practical physics at the Bradford Grammar School during the last three years, and the presumption is that experience has proved their usefulness and suitability. An examination of the volumes, however, suggests that the notes have in practice probably been supplemented by judicious additions by the teachers, or the results of the instruction would have been less satisfactory. The volumes contain no illustrations to show pictorially the arrangements of the apparatus described; one page only seems to be devoted to the plotting of curves, and on this page there is by no means enough explanation to explain to a young student the method and meaning of such graphic representation; and, more than this, under the section Boyle's law, the pupil is instructed to plot a curve connecting  $P$  and  $1/V$ , and in another place to plot a curve connecting the square root of the length of a pendulum and the time of swing, though the only remarks on curve plotting, instead of preceding these instructions, follow in another experiment. In several places, too, the verbal instructions seem inadequate to the needs of beginners. In describing the screw gauge the authors content themselves by saying that the zero error must be ascertained carefully, and give no directions as to how this should be done. The account of the vernier is similarly too brief. To secure the best results in a physical laboratory the student should be in possession of directions explicit enough to avoid the waste of time caused by waiting for the master to arrive to clear up a difficulty, and these directions should be obtainable from the book or be given in a preliminary demonstration. Notwithstanding the remark of the authors that experimental work in sound is only suitable for a later stage, there are many experiments in this branch of physics that interest young people and are understood by them. On the whole, however, the course is comprehensive and generally in accordance with the experience of good laboratory practice.

*Flora of the Upper Gangetic Plain and of Adjacent Siwalik and Subhimalayan Tracts.* Vol. i., part i. By J. F. Duthie, B.A., F.L.S. Pp. xvii + 403. (Calcutta: Office of the Department of Government Printing, 1903.) Price 15s.

IT is only by a very liberal interpretation of the term that this book can be referred to as a *local* flora, seeing that it deals with an area of 196,000 square miles, which includes not only the North-West Provinces up to the Subhimalayan slopes, but extends southwards to the Vindhya Mountains, and thus takes in portions of some dependent States. But as a comparative term, when contrasted with Sir J. Hooker's "Flora of British India," the expression has been applied both to this flora and also to Dr. T. Cooke's "Flora of the Bombay Presidency." A very satisfactory feature of the book is the facility which is offered for obtaining information quickly and easily. A synopsis of the natural orders is given, arranged on principles similar to those which are so well known from Hooker's "Student's Flora," arrangement being based primarily on the characters of the ovary. For each order and genus full descriptions and determining keys are provided, and for the species references, synonyms, locality